# FINANCIAL CRISES AND DEPRESSIONS ECON 4033

#### **STUDY SHEET**

The exam will have two parts. The first part will consist of one or two questions based on the problem sets. The second part will have one or two essay questions. If there is more than one question in a part, you will be asked to choose one question to answer.

## Part I.

1. Consider an economy that has the aggregate production function

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

and in which feasible consumption and investment plans  $(C_t, I_t)$  satisfy

$$C_t + I_t = Y_t$$
$$K_{t+1} = (1 - \delta)K_t + I_t$$

- a) Define a balanced growth path for this economy.
- b) How would you measure  $A_t$ ? Discuss the significance of  $A_t$ .
- c) The growth accounting

$$\frac{Y_t}{N_t} = A_t^{\frac{1}{1-\alpha}} \left(\frac{K_t}{Y_t}\right)^{\frac{\alpha}{1-\alpha}} \frac{L_t}{N_t}$$

decomposes the growth and fluctuations in real GDP per working-age person into three factors, one of which depends on total factor productivity, one of which depends on the capital/output ratio, and the third of which depends on hours worked per working-age person. Explain how you would expect this growth accounting to look for an economy whose data are close to being a balance growth path.

d) The graph below shows a growth accounting exercise for Finland over the years 1980–2000. What are the major deviations from balanced growth? Discuss what happens during different time periods. Explain what you learn about the Finnish economy from this exercise.

[The question on the exam would ask about growth accounting for Mexico.]

References:

Notes on Modeling Great Depressions, Growth Accounting, on Balanced Growth Paths, and on Chile and Mexico on the course website

Notes on How to Construct the Capital Stock and Parameters on the Great Depressions Book website

Introduction in Kehoe-Prescott

Finland chapter in Kehoe-Prescott

Mexico-Chile chapter in Kehoe-Prescott.



### Growth accounting for Finland

2. Consider a model with an infinitely-lived, representative consumer. The production function is  $Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$ . The consumer solves the problem

$$\max \sum_{t=t_0}^{\infty} \beta^{t-t_0} [\gamma \log C_t + (1-\gamma) \log(N_t \overline{h} - L_t)]$$
  
s.t.  $C_t + K_{t+1} - K_t = w_t L_t + (r_t - \delta) K_t$ ,  $t = t_0, t_0 + 1, t_0 + 2, \dots$   
 $K_{t_0} = \overline{K}_{t_0}$ .

The sequences of total factor productivities  $A_{t_0}, A_{t_0+1}, A_{t_0+2}, \dots$  and of working age populations  $N_{t_0}, N_{t_0+1}, N_{t_0+2}, \dots$  are exogenous.

a) Define an equilibrium of this economy.

b) Write out the first order conditions for the consumer's problem and the first order conditions for profit maximization. Explain how you would use these conditions and data to calibrate the parameters  $\beta$  and  $\gamma$ .

c) Explain how you could use the conditions part b to calculate an equilibrium for this model based on data from a specific country over a specific period of time.

d) The graphs below compare the data for Finland with the results of a model that takes the sequences  $A_{t_0}, A_{t_0+1}, A_{t_0+2}, \dots$  and  $N_{t_0}, N_{t_0+1}, N_{t_0+2}, \dots$  as exogenous and that is calibrated to Finnish data. What are the major deviations of the model's performance from the data? Explain what you learn about the Finnish economy from this exercise.



[The question on the exam would ask about a comparison of the results of the model and the data for Mexico.]

References:

Notes on Modeling Great Depressions, on Chile and Mexico, on the Growth Model, and on Equilibrium of the General Equilibrium Growth Model on the course website

Notes on How to Construct the Capital Stock and Parameters and on How the Model Works on the Great Depressions Book website

Introduction in Kehoe-Prescott

Finland chapter in Kehoe-Prescott

Mexico-Chile chapter in Kehoe-Prescott.

3. Consider a simple version of the Diamond-Dybvig model of banking. There are three periods: 0,1,2. There is a single, storable good. There are many consumers who make a total deposit, which we normalize to 1 unit, in t = 0. The technology for investing in a project is given by the diagram:



The good can be invested in a project that pays R > 1 in t = 2 for each unit in t = 0. The project can be shut down in t = 1 and the investment can be salvaged one-for-one. A project that is shut down cannot be restarted. Consumers can store the good. The consumer's utility is  $v(c_1, c_2, \theta)$ , where  $\theta$  takes on the value 1 or 2 in t = 1

$$v(c_1, c_2, 1) = u(c_1)$$
  
$$v(c_1, c_2, 2) = \beta u(c_1 + c_2).$$

Here  $u(c) = \frac{c^{1-\sigma} - 1}{1-\sigma}$ .

a) Suppose that the probability that a consumer has the liquidity shock  $\theta = 1$  in t = 1 is  $\lambda$ ,  $0 < \lambda < 1$ . What is the maximum expected utility for a consumer who invests on his own?

b) Suppose now that all the consumer deposit in a bank in t = 0. Liquidity shocks are independent across consumers. Now  $\lambda$  is the fraction of depositors who receive the liquidity shock  $\theta = 1$  in t = 1 as well as the probability that and individual consumer receives the shock. Set up and explain the bank's optimal deposit contract problem of determining  $c_1^1, c_1^2, c_2^2$ , where the bank pays  $c_t^{\theta}$  in period t to the depositor who has liquidity shock  $\theta$ .

c) Show that, in the optimal deposit contract, if  $R > 1/\beta > 1$  and  $\sigma \ge 1$ ,

$$1 < c_1^1 < c_2^2 < R$$
.

Interpret this contract in terms of gross rates of returns  $r_t$  on deports withdrawn in period t.

d) Suppose now that the type of a depositor in t = 1 is not verifiable, that is, it is private information. Argue that, if other patient depositors start to run on the bank every depositor will want to run on the bank. Argue that the government, by providing deposit insurance or serving as a lender of last resort, can stop a bank run.

e) Discuss the strengths and weaknesses of this model as a model of financial panics.

References:

Notes on the Diamond-Dybvig Model on the course website

D. W. Diamond (2007), "Banks and Liquidity Creation: A Simple Exposition of the Diamond-Dybvig Model."

D. W. Diamond and P. H. Dybvig (1983), "Bank Runs, Deposit Insurance, and Liquidity."

N. Wallace, "Another Attempt to Explain an Illiquid Banking System: The Diamond and Dybvig Model with Sequential Service Taken Seriously."

Information on a specific financial crisis from, for example, N. Ferguson, *The Ascent of Money: A Financial History of the World* or C. P. Kindleberger and R. Aliber, *Manias, Panics, and Crashes*.

# Part II.

1. Timothy Kehoe, Edward Prescott, and their collaborators hypothesize that general lessons can be learned by studying large economic downturns with a single analytical framework that uses growth accounting and a general equilibrium growth model. A number of economic historians object, claim that depressions are unique historical events, each with a complex interaction of distinct causes. Discuss, stressing the policy implications of each point of view.

References:

Introduction in Kehoe-Prescott

Criticisms of Kehoe-Prescott on website

G. Fernández de Córdoba and T. J. Kehoe, "The Current Financial Crisis: What Should We Learn from the Great Depressions of the Twentieth Century?"

T. J. Kehoe and E. C. Prescott, "Using the General Equilibrium Growth Model to Study Great Depressions: A Reply to Temin."

C. P. Kindleberger and R. Aliber, Manias, Panics, and Crashes, Chapter 2.

2. In their *Monetary History of the United States*, Milton Friedman and Anna Schwartz hypothesize that it was a lack of leadership in the Federal Reserve System that turned the October 1929 stock market crash into the contraction phase of the U.S. Great Depression 1929–1933. Discuss, stressing the policy implications of this point of view.

References:

M. Friedman and A. J. Schwartz, *The Great Contraction*, 1929-1933. (See, in particular, the remarks by B. S. Bernanke at the back of the book.)

If you want to argue against the Friedman-Schwartz hypothesis, you can find arguments in, for example, C. P. Kindleberger, *The World in Depression, 1929-1939*.

3. The conclusion of Timothy Kehoe and Edward Prescott's Great Depressions project is that it is misguided government policy following adverse shocks to the economy that leads to a fall in productivity and results in a great depression. Discuss with particular reference to a particular depression episode. Stress the policy implications of this hypothesis.

References:

T. J. Kehoe and E. C. Prescott, *Great Depressions of the Twentieth Century*.

Criticisms of Kehoe-Prescott on website

G. Fernández de Córdoba and T. J. Kehoe, "The Current Financial Crisis: What Should We Learn from the Great Depressions of the Twentieth Century?"

4. A number of economic historians, such as Charles Kindleberger and Niall Ferguson, as well as current economic commentators such as Paul Krugman, argue that it is swift and massive government intervention following a financial crisis that prevents a great depression. Critics argue that such policies create massive moral hazard problems and that, to a large extent, it is the expectations of such policies being enacted that cause financial crises to start with. Discuss with reference to a specific financial crisis.

References:

N. Ferguson, The Ascent of Money: A Financial History of the World.

C. P. Kindleberger and R. Aliber, Manias, Panics, and Crashes: A History of Financial Crises.

5. Charles Kindleberger agues that it was a breakdown in the international financial system in the late 1920s and early 1930s that led to the Great Depression. He also argues that a powerful international lender of last resort could have prevented, or at least lessened the impact of, the worldwide Great Depressions of the 1930s. Discuss with reference to policy implications for the recent worldwide financial crisis.

References:

V. V. Chari and P. J. Kehoe (1998), "Asking the Right Questions About the IMF," *Federal Reserve Bank of Minneapolis Annual Report Essay.* 

C. P. Kindleberger, The World in Depression, 1929-1939, Chapter 14.

C. P. Kindleberger and R. Aliber, *Manias, Panics, and Crashes: A History of Financial Crises*, Chapters 12 and 13.